V. ENVIRONMENTAL IMPACT ANALYSIS
D. GEOLOGY AND SOILS

This section is based on the Preliminary Geotechnical Investigation and Geologic Hazard Evaluation (Geotechnical Investigation) prepared by Leighton and Associates, Inc. and the Grading Memorandum prepared by Sharma General Engineering Contractors, Inc. for the proposed PacifiCenter project (refer to Appendices H and I of this EIR for copies of these materials).

1. ENVIRONMENTAL SETTING

a. Existing Conditions

(1) Physiography and Topography

The project site lies within the southern portion of the Downey Plain, a relatively flat, alluvial coastal plain within the Los Angeles Basin. The majority of the project site is located in the northern portion of the City of Long Beach, while the remainder of the project site is located in the southwest portion of the City of Lakewood. The Dominguez Hills are located approximately 4 miles west of the project site. In addition, Signal Hill sits approximately 1.75 miles southwest of the site, with elevations reaching approximately 400 feet above mean sea level (amsl). The Los Angeles River, which runs in a north-south direction and drains into the Pacific Ocean, is located 2.5 miles west of the site.

Elevations within the project site range from approximately 54 feet amsl at the western border of the site to a minimum elevation of approximately 34 feet amsl at the southeast end of the site, with a total difference in elevation throughout the site of about 20 feet. As such, the site exhibits a southeast gradient of approximately 0.35 to 0.4 feet per 1,000 feet, which is considered to be relatively flat with little topographic relief.[119]

[119] *Tetra Tech, Inc., Boeing C-1 Long Beach Facility, Phase I ESA Report, February 2000.*

(2) Soils

Quaternary non-marine terrace deposits underlie the entire project site.[120] The natural soil types found on the project site generally consist of interlayered mixtures of sand, silt, and clay to the maximum explored depth of approximately 61.5 feet. Granular materials found on-site are typically medium dense to very dense, and fine-grained soils are generally stiff to hard. However, layers of loose sand and silty sand have been encountered in past borings. Surficial fill materials of varying depths are assumed to exist throughout the site under existing building areas and as backfill for previous excavations and foundations.

The project site contains shallow soils that exhibit low to moderately expansive properties and moderate to highly compressible properties. However, as indicated in the Geotechnical Investigation, the collapse potential of the subsurface soils is estimated to be low.[121]

(a) Soil Corrosivity

Soil corrosion involves the deterioration of reinforced concrete foundations or various types of steel substructures due to a reaction with the surrounding soils. As indicated in the Geotechnical Investigation, the soils on the project site are anticipated to have a low potential for concrete deterioration, but would provide a slightly corrosive environment for buried metals and a corrosive environment for ferrous materials.

(3) Slope Stability

Landslides are typically associated with slope instability or earthquake-induced ground movement that occurs in proximity to steep canyons or hillsides. Based on the relatively flat topography of the site, the potential for landslides to affect the project site is remote. In addition, the California Geological Survey (CGS) within the Department of

[120] *Patrick Schmidt, Leighton and Associates, personal communication, July 13, 2001.*

[121] *Leighton and Associates, Geotechnical Investigation and Geologic Hazard Evaluation, October 2002.*

Conservation has not identified any areas in the project vicinity containing unstable slopes which may be prone to seismically produced landslides.[122]

(4) Tectonic Setting and Seismicity

(a) Faulting and Ground Shaking

The project site is located in a seismically active region of southern California and, therefore, could be exposed to strong ground motion or ground shaking during a seismic event. As shown in Figure 36 on page 328, several active and potentially active faults are located within southern California. Regional active faults that could produce considerable ground shaking at the site include, but are not limited to, the following: Newport-Inglewood, Palos Verdes, Elysian Park Thrust, and Whittier. Of these faults, the Newport-Inglewood Fault is closest to the project site with surface projections of potential rupture area located 2.5 miles from the site.

Important factors which determine the ground shaking intensity at a given location include: distance from the epicenter; size or magnitude of the earthquake; and local soil, geologic, and hydrologic conditions.[123] In accordance with CGS criteria, Peak Horizontal Ground Accelerations (PHGA) for the site were estimated using probabilistic seismic hazard analysis. As indicated in the Geotechnical Investigation, this analysis suggests a maximum probable earthquake (10 percent probability of exceedance in 50 years) ground acceleration of 0.53 g for the site.[124,125] This value is considered to be within the typical range for the Long Beach area.

Ground rupture is defined as the surface displacement caused by an earthquake. The project site is not located in an Alquist-Priolo Earthquake Fault Zone as defined by the

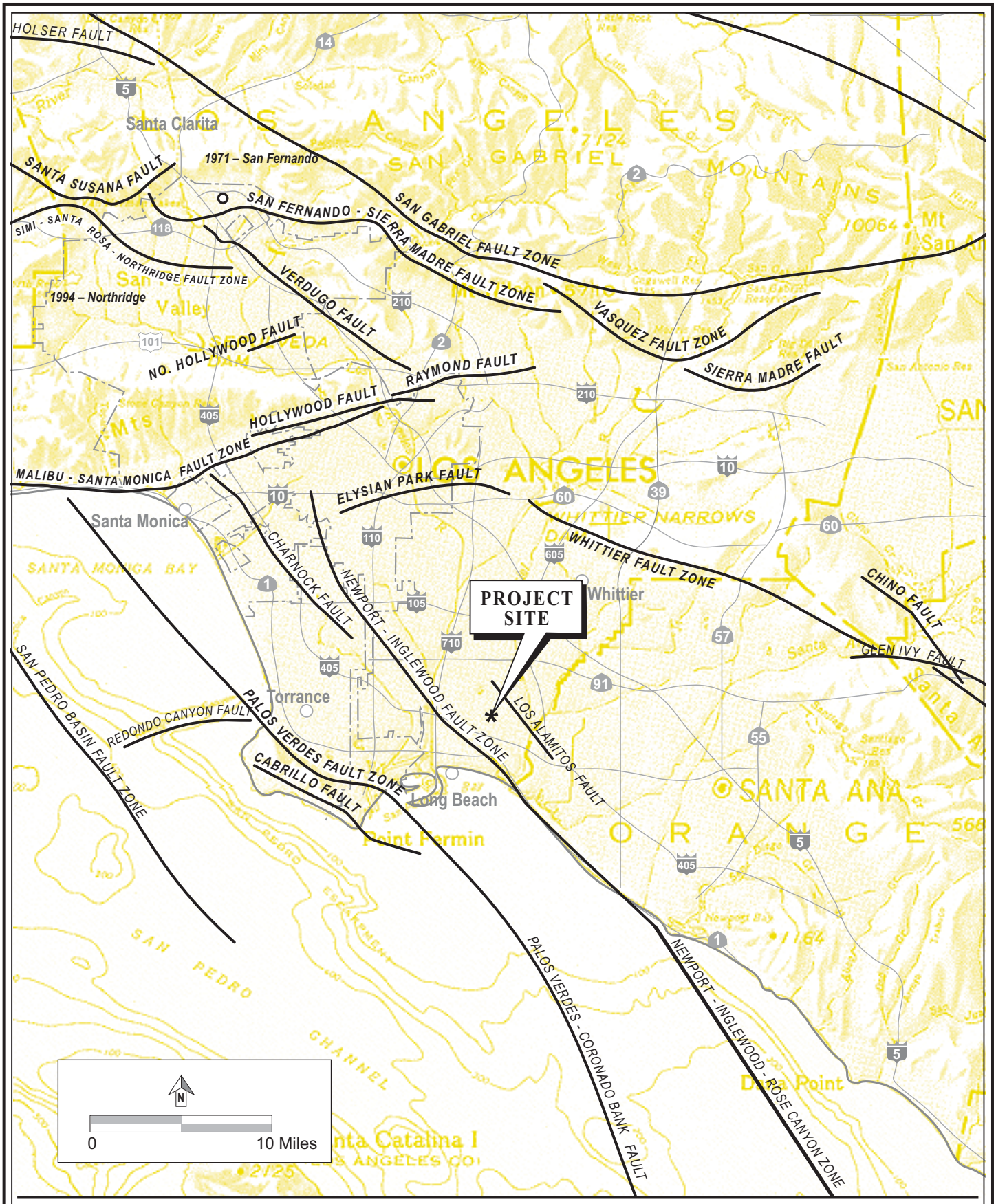
---

[122] *California Geological Survey, ftp://ftp.consrv.ca.gov/pub/dmg/shezp/evalrpt/zipped/OFR98-19.pdf, December 6, 2002.*

[123] *As discussed in the Geotechnical Investigation, the most probable magnitude of earthquakes that dominate the potential hazard at the site is 6.75 Mw (moment magnitude). The distance to the earthquake that contributes most to the potential hazard at the site (modal distance) is approximately 1.25 miles.*

[124] *g = acceleration due to gravity*

[125] *As discussed in the Geotechnical Investigation, 10 percent probability of exceedance in 50 years ground acceleration is the value typically used for design of structures, such as those proposed for the PacifiCenter project. The upper bound earthquake (10 percent probability of exeedance in 100 years) PHGA was determined to be approximately 0.69 g, which is considered in the design of essential structures, such as hospitals.*



PCR

Figure 36
Major Regional Faults

Source: U.S.G.S 1999 Data 1994 Fault Activity DMG Open-File Report by C. Jennings and PCR Services Corporation, July 2003

CGS. As discussed in the Geotechnical Investigation, the closest Alquist-Priolo Earthquake Fault Zone is associated with the Newport-Inglewood Fault, approximately 2.5 miles southwest of the site.[126] No evidence of known active fault traces have been mapped at the project site. Therefore, the potential for primary ground rupture within the project site during a seismic event is low.

(b) Other Seismic Conditions

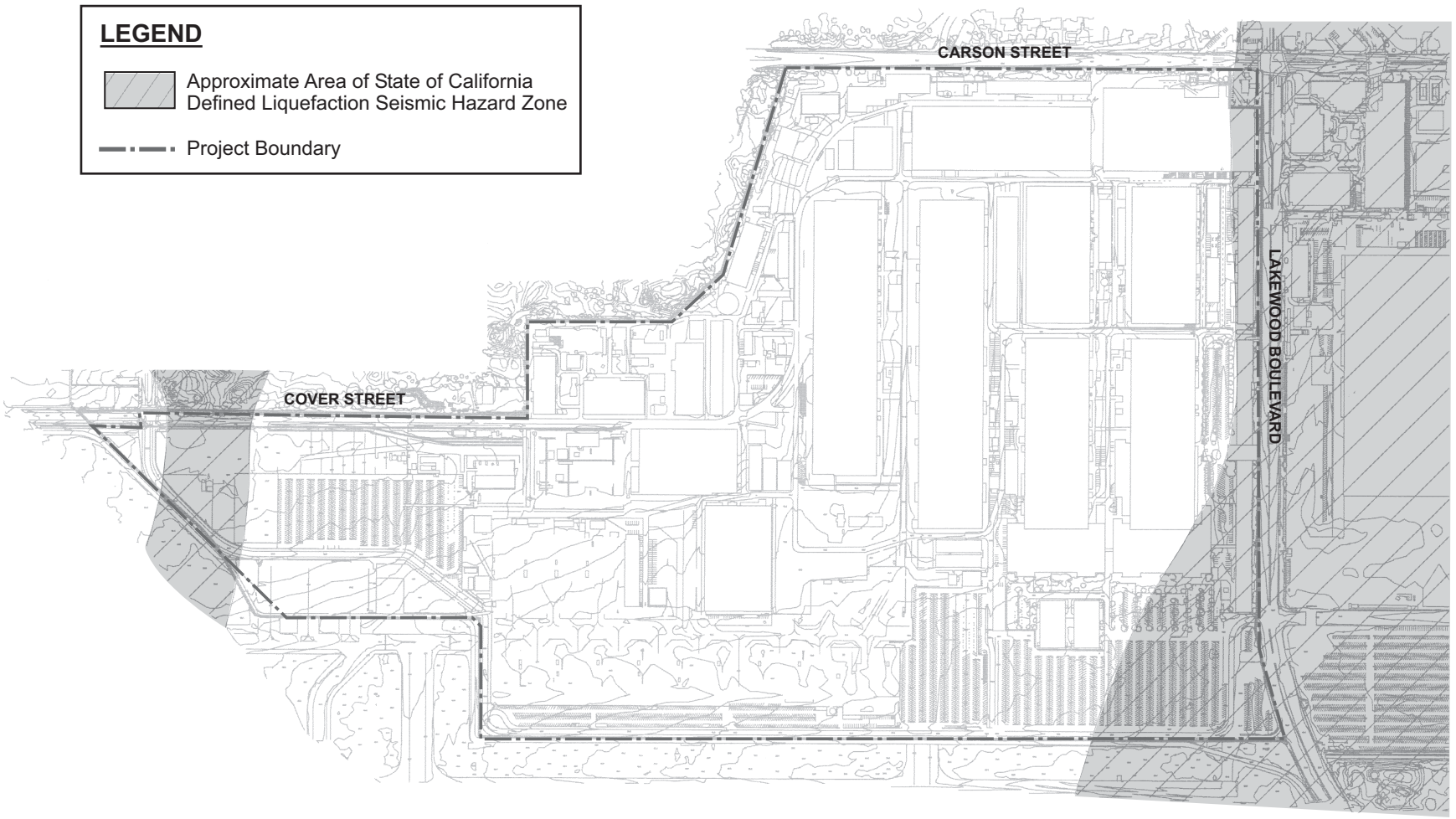
Hazards associated with seismic activity other than faulting and ground shaking include the following:

Liquefaction and Seismic Settlement. Liquefaction is a phenomenon in which the structure of saturated soil collapses during strong ground shaking of considerable duration, causing water pressure in the soil to rise sufficiently to make the soil behave like a fluid for a short period of time. As a result, the soil temporarily loses considerable strength and capacity. Liquefaction generally occurs when three conditions exist: shallow groundwater; low density, fine, clean sandy soils; and high density ground motion. The effects of liquefaction on level ground include settlement and bearing capacity failures below structural foundations.

As previously discussed, granular materials found within the project site were typically medium dense to very dense, and fine-grained soils were typically stiff to hard. These soils are not generally susceptible to liquefaction. Although loose granular soils, which are more susceptible to liquefaction, were encountered in some borings during field investigations, the preliminary geotechnical analysis indicates that liquefaction is not generally expected to be an important concern for the site. However, the potential for liquefaction could affect areas within the eastern and western portions of the site, which are located within Liquefaction Hazard Zones as determined by CGS (refer to Figure 37 on page 330). As indicated in the Geotechnical Investigation, in order for liquefaction to significantly affect these areas of the site, existing groundwater levels would need to rise 10 to 20 feet above current groundwater levels. If this were to occur, liquefaction settlement (i.e., when the ground surface settles) could be on the order of one to two inches or less.

---

[126] *Alquist-Priolo Earthquake Fault Zones (formerly Special Study Zones) have been established throughout California. These zones identify areas where potential surface rupture along a fault could prove hazardous. The zones identify where special studies are required to characterize hazards to habitable structures*



PCR

N

0 1000 Feet

Source: Leighton and Associates, 2003

Figure 37
Liquefaction Hazard Zones

Lateral Spreading. Seismically induced lateral spreading is caused by the lateral movement of earth materials due to ground shaking. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. As discussed in the Geotechnical Investigation, due to the types of soils on-site, the potential for lateral spreading is very low.

Seiche and Tsunami. A seiche is the oscillation of a body of water in an enclosed or semi-enclosed basin, such as a reservoir, storage tank, or lake, in response to earthquake activity. There are no enclosed bodies of water within the project site that can experience seiches during an earthquake. The closest water body to the site is Bouton Lake, located in the Lakewood Country Club Golf Course, approximately 400 feet north of the site. Given the distance of this body of water from the project site, the potential for seiches at the site is low.

A tsunami is a series of waves of extremely long wavelength (distance between two sucessional waves) and long period (time between two sucessional waves). A tsunami can be generated by any disturbance that displaces a large water mass from its equilibrium position and can be associated with earthquakes, landslides, volcanic eruptions, and nuclear explosions. Tsunamis are typically caused by large shallow earthquakes when tectonic displacement of the sea floor occurs and the overlying water is displaced from its equilibrium position. The project site's distance from the ocean precludes the potential for tsunamis.

Seismically Induced Flooding. Seismically induced flooding occurs when water retention structures or facilities (such as dams or above-ground detention facilities) fail, allowing water to flow downstream unabated at higher-than-normal volumes. The project site is not located within close proximity to any water retention structures or facilities. Therefore, as discussed in the Geotechnical Investigation, the potential for seismically induced flooding to occur is considered low.

(5) Mineral Resources

According to CGS, there are no known mineral resources located within the portion of the project site located within the City of Long Beach, or the portion of the project site located within the City of Lakewood.[127]

[127] *Russell Miller, Geologist, California Department of Conservation, California Geological Survey (formerly the Division of Mines and Geology), personal communication, June 11, 2001.*

b. Regulatory Framework

(1) California Department of Conservation, California Geological Survey [128]

The CGS provides guidance with regard to seismic hazards. Under CGS's Seismic Hazards Mapping Act, seismic hazard zones are to be identified and mapped to assist local governments in planning and developing purposes. The intent of this publication is to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. In addition, CGS's *Special Bulletin 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California* provides guidance for the evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations.

(2) City of Long Beach

Building and construction within the City of Long Beach are subject to the regulations of the City of Long Beach Municipal Code. Municipal Code Chapter 18.24, Building Codes, adopts and incorporates by reference the California Building Code, Volumes I and II, 2001 edition. This Municipal Code chapter includes amendments and modifications to the California Building Code that are specific to the City of Long Beach. The California Building Code in turn incorporates provisions of the Uniform Building Code (UBC), which contains seismic design criteria and grading standards.

The City of Long Beach adopted the Seismic Safety Element of the General Plan in October 1988. The purpose of this element is to provide a comprehensive analysis of seismic factors in order to reduce the loss of life, injuries, damage to property, and social and economic impacts resulting from future earthquakes. The Seismic Safety Element contains goals and recommendations that provide guidance for development in seismically active areas. Specifically, the Element contains goals such as: (1) reducing public exposure to seismic risks; (2) providing an urban environment which is as safe as possible from seismic risk; and (3) providing the maximum feasible level of seismic safety protection services.[129]

---

[128] *The California Geological Survey was formerly known as the Division of Mines and Geology.*

[129] *City of Long Beach, Seismic Safety Element, City of Long Beach General Plan, October 1988, pages 9-10.*

(3) City of Lakewood

The City of Lakewood Municipal Code regulates building and construction within the City of Lakewood. With regard to seismic design criteria, the City of Lakewood follows the Los Angeles County Code, which adopts and amends the 2002 edition of the UBC. In addition, the City of Lakewood defers to Los Angeles County Code, Chapter 70, Excavation and Grading, with regard to regulations governing grading activities. Chapter 70 contains regulations for the control of excavation, grading, earthwork construction, and the control of grading site runoff, including erosion sediments.

The City of Lakewood adopted the Safety Element of the Comprehensive General Plan in November 1996. The Safety Element addresses issues associated with the protection of the public from geological hazards, as well as appraisal of all potential seismic and geologic hazards. The Safety Element contains specific goals and policies, such as: (1) minimizing personal and property damage from earthquakes; and (2) requiring all new development to comply with established seismic safety standards.[130] Consistency with these goals and policies are intended to help minimize impacts associated with seismic and geologic hazards.

2. ENVIRONMENTAL IMPACTS

a. Methodology

An assessment of proposed grading, site design, and existing seismicity conditions was performed to identify potential impacts associated with geology and soils. As indicated above, the analysis is based on the Geotechnical Investigation, which was prepared by Leighton and Associates, Inc. and is included as Appendix H of this EIR. The Geotechnical Investigation was prepared based on review of existing documentation, field investigations (subsurface exploration), and laboratory testing. In addition, the Grading Memorandum prepared by Sharma General Engineering Contractors, Inc., included as Appendix I of this EIR was reviewed in preparation of this analysis.

[130] *City of Lakewood, City of Lakewood Comprehensive General Plan Policy Document, pages 7-8.*

b. Thresholds of Significance

For the purposes of this analysis, a distinction is made between geotechnical impacts associated with proposed grading and site design activities and impacts related to seismic events. Impacts will be considered significant if:

(1) Grading and Site Design

- Development of the proposed project will result in substantial soil erosion or the loss of topsoil;
- The project will be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse;
- The project will be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or
- Proposed grading and earthmoving plans are not in accordance with applicable City of Long Beach or City of Lakewood regulations.

(2) Seismicity

- The proposed project will expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking; or
  - Seismic-related ground failure, including liquefaction.

c. Project Features

The PacifiCenter project will be constructed in accordance with State and City regulations and ordinances governing earthwork activities and seismicity. In addition, as part of the project, detailed geotechnical studies will be prepared for each building to be constructed to minimize potential geological impacts as required under the City of Long

Beach and City of Lakewood Municipal Codes. The proposed project will also comply with California Building Code and UBC requirements, which are adopted and amended in the Municipal Codes, to minimize seismic hazards. Furthermore, the project will comply with the CGS *Special Bulletin 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California* (1997). Additionally, grading plans will be designed such that final grades will be compatible with streetscape grades and soil erosion will not flow off-site.

d. Analysis of Project Impacts

(1) Grading and Site Design

As discussed in Section III, Project Description, the PacifiCenter project will provide new R&D, light industrial, office, retail, hotel, housing, aviation-related, and ancillary uses within a site recently developed with over five million square feet of floor area. The Geotechnical Investigation indicates that the project site is suitable for development of the proposed uses.

As a separate approved project, demolition and soil removal will occur within much of the project site prior to the commencement of project construction as part of a soil and groundwater remediation program currently underway per Cleanup and Abatement Order 95-048 (refer to Section IV, Overview of Environmental Setting, for a description of the remediation program). Such activities will involve the grading, removal, and export of contaminated soils identified on the site, and demolition of all existing development. Demolition activities within the Boeing Enclave may also occur at some future date as a result of the mandated remediation program. However, to provide for a conservative analysis, this EIR assumes that demolition of the Boeing Enclave will ultimately be completed as part of the project.

Overall, project grading is estimated to require a total of 319,309 cubic yards of cut and 325,311 cubic yards of fill. Additionally, to compensate for existing soil compaction deficiencies and prepare the site for new development, approximately 1.74 million cubic yards of soil will be overexcavated and recompacted. It is assumed that overexcavation and recompaction will occur to an average depth of 3 feet in the designated commercial areas of the project site and 6 feet within the residential areas. For the purposes of evaluating the environmental impacts of the PacifiCenter project relative to geology and soils, this remedial grading of 1.74 million cubic yards of soil is considered part of the project. Shrinkage on the order of 15 percent was assumed for both cut and fill operations and remedial grading.

Taking soil shrinkage, overexcavation, and recompaction into account, total net import of an estimated 347,015 cubic yards of soil may be necessary throughout the course of project development. However, the precise amount of import required will vary depending on actual shrinkage and the extent to which demolition spoils (from both the Boeing Enclave and the balance of the site) may be used as crushed base material for project street sections. The amount of import will also vary based on the development of individual sites within the project boundaries. Excess soil generated from the grading of individual sites, installation of underground utilities, excavation for foundations, and fine grading may reduce or eliminate the need for the importation of soil (where the excess soil is consistent with the standards set forth in the Risk Management Plan (RMP) as discussed in Section V. E, Hazards and Hazardous Materials, of this EIR). To account for the final development of individual sites, each construction phase will create an area that is lower than the adjacent finished grade to accommodate any excess soil generated during final development of that area. Any importation of soil may therefore be deferred to the end of project construction and could be substantially less than the amount estimated.

Activities associated with the importation of soil will occur in accordance with City of Long Beach and City of Lakewood Public Works Departments' requirements (please see Section V.D.1.b., Regulatory Framework, above) as specified through grading plan review and approval. In addition, if contaminated soil is encountered during earth-moving activities, appropriate measures will be taken for the cleanup and/or disposal of the soil, as set forth in Section V.E, Hazards and Hazardous Materials, of this EIR and the RMP set forth therein.

The overall final grading of the site will be similar to existing conditions and the site will remain relatively flat. Grading activities will result in maximum and minimum final grades of approximately 57 feet and 34 feet, respectively. Since the project site is relatively flat, and grading and construction will comply with California Building Code, UBC, and CGS requirements, project implementation will not cause unstable soil conditions. In addition, as previously indicated, the collapse potential for subsurface soils is estimated to be low. Furthermore, on-site soils that may be compressible or expansive will be overexcavated and compacted in accordance with requirements set forth in the site-specific geotechnical studies required for the project. Therefore, the project will not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. Therefore, impacts associated with unstable soils will be less than significant. Impacts associated with expansive soils will also be less than significant.

Since the project will require substantial grading and filling, erosion could occur on-site. Specifically, grading, excavation, and other earth-moving activities could expose site soils to wind- or water-generated erosion. However, as described in Section V.G, Water Quality, of this EIR, best management practices (BMPs), which will reduce and/or eliminate erosion potential, will be developed as part of the proposed project. Implementation of BMPs will ensure that development of the project will not result in substantial soil erosion or the loss of topsoil. Therefore, erosion-related hazards will be minimized on the site and impacts will be less than significant.

As previously discussed, the Geotechnical Investigation indicates that the on-site soils could provide a corrosive environment for steel components required for building foundations. However, additional testing will be conducted in accordance with the requirements of site-specific, detailed geotechnical studies to be prepared as specific buildings are proposed. Construction techniques required by these detailed geotechnical reports and California Building Code/UBC requirements may include, but will not be limited to, providing a protective coating for below-grade steel components and 3-inch concrete covers on all steel and wire concrete reinforcements.

The Geotechnical Investigation indicates that several foundation construction methods will be potentially suitable for support of the proposed development. In general, it is expected that proposed two- to four-story buildings could be supported by shallow foundation systems on compacted fill soils. It is anticipated that buildings of five or more stories in height will require a deep foundation scheme, such as driven piles, extending 40 to 60 feet below site grade. The actual method of foundation support of proposed buildings will be determined based on structure-specific geotechnical studies that are required to be prepared in accordance with the California Building Code and/or UBC.

Other associated or indirect impacts could occur from the grading of the site. Refer to Section V.B, Air Quality, of this EIR regarding impacts associated with dust. Refer to Sections V.B, Air Quality, and V.G, Water Quality, of this EIR regarding soil erosion. Refer to Section V.E, Hazards and Hazardous Materials, of this document regarding soil and groundwater contamination. In addition, refer to Section V.L, Transportation and Parking, regarding impacts associated with construction traffic.

(2) Seismicity

As previously discussed, no known active or potentially active faults pass directly beneath the project site. In addition, the site is not located in a known fault hazard zone. However, known regional active faults (i.e., the Newport-Inglewood, Palos Verdes, Elysian Park Thrust, and Whittier Faults) could produce substantial ground-shaking at the project

site. Therefore, similar to development throughout southern California, implementation of the proposed project will result in exposure of the on-site residents and employees to a degree of seismic hazard risk. The proposed project will be constructed in accordance with California Building Code, UBC, and Municipal Code requirements. In addition, as previously discussed, the maximum probable earthquake ground acceleration of 0.53 g will be taken into consideration when designing all structures on the project site to minimize potential seismic hazards. Furthermore, geotechnical studies prepared for each building on the project site will be undertaken in accordance with the CGS *Special Bulletin 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California* (1997), which provides guidance for evaluation and mitigation of earthquake-related hazards. Therefore, potential impacts associated with the exposure of people or structures to seismic hazards, including rupture of a known earthquake fault and strong seismic ground shaking, will be reduced to the extent possible and will be less than significant.

As previously discussed, other potential impacts associated with seismic activities that could occur on the site include liquefaction. In general, the site soils are not susceptible to liquefaction. However, as shown on Figure 37 on page 330, the eastern edge and western portions of the site are located within the CGS Liquefaction Seismic Hazard Zone. [131] Potential impacts due to liquefaction could include foundation bearing failure or large foundation settlements, imposition of additional loads on foundations, localized lateral displacement (lateral spreading) or lateral compression, flotation of light structures with basements or underground storage structures, and damage to infrastructure such as streets and utilities. However, the liquefaction potential will be evaluated as part of a detailed geotechnical study for each new building and for any new proposed infrastructure, as required by the California Building Code/UBC. As discussed in the Geotechnical Investigation, the site-specific geotechnical studies may require deep foundations such as driven piles to support buildings of five or more stories. In addition, recommendations for structural design will be included in the site-specific geotechnical studies to accommodate for any potential liquefaction settlement. The geotechnical and liquefaction studies will be carried out in accordance with California Building Code/UBC requirements and CGS *Special Bulletin 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California* (1997). Therefore, impacts associated with liquefaction will be less than significant.

[131] *As previously discussed, in order for liquefaction to significantly affect these areas of the site, existing groundwater levels would need to rise 10 to 20 feet above current groundwater levels.*

The PacifiCenter project will be consistent with goals and recommendations of the Seismic Safety Element of the Long Beach General Plan by minimizing public exposure to seismic risks and providing an urban environment that is as safe as possible from seismic risk. Project implementation will also be consistent with goals and policies of the Safety Element of the City of Lakewood Comprehensive General Plan by complying with established seismic safety standards. Therefore, the proposed project will not conflict with goals, policies, and recommendations set forth by the City of Long Beach or the City of Lakewood, and no significant impacts will occur.

3. CUMULATIVE IMPACTS

Grading and excavation impacts, including the potential for unstable soils, erosion, and landslides to occur, are typically confined to a project site or a very localized area. As such, the geographic area for the cumulative analysis associated with grading, site design, and seismicity is the Cities of Long Beach and Lakewood, with a focus on related projects located in the immediate project vicinity. As mentioned above and discussed more fully in Section IV, Overview of Environmental Setting, a soil and groundwater remediation program (Related Project No. 44) is presently underway at the project site in accordance with Cleanup and Abatement Order 95-048 issued by the California Regional Water Quality Control Board, Los Angeles Region. To facilitate the effectiveness of this remediation program, many of the existing on-site structures are in the process of being removed. These structures have been approved for demolition under separate permit by the City of Long Beach. Soil removal may be necessary as part of the remediation program, and affected areas will be excavated, backfilled with clean soil, and recompacted. As discussed above, the 1.74 million cubic yards of soil work associated with overexcavation and recompaction prior to project development has been evaluated as part of the project.

The simultaneous development of the PacifiCenter project and nearby projects, including the on-site remediation program (Related Project No. 44) and other cumulative development (Related Project Nos. 6, 12, etc.), will not result in cumulatively significant impacts associated with grading and site design, since each project will comply with the California Building Code, UBC, and Municipal Code requirements for grading; project-specific geotechnical recommendations by certified geologists and geotechnical engineers; and the measures set forth in Section V.E, Hazards and Hazardous Materials, of the EIR and in the RMP. Furthermore, soil overexcavation and recompaction activities will have a beneficial effect on the project by increasing soil stability on-site. Therefore, the project will not contribute to cumulative impacts in the area.

Development of the proposed project and cumulative projects will result in a concentration of people in Los Angeles County being exposed to seismic hazards since seismic events are experienced throughout the region. However, each project will be constructed in accordance with the California Building Code and UBC, which contain seismic design criteria, and local building regulations per the City of Long Beach Municipal Code and the City of Lakewood Municipal Code. In addition, projects will comply with project-specific geotechnical recommendations by certified geologists and geotechnical engineers. Therefore, cumulative seismic impacts in the area surrounding the project site will be less than significant.

4. MITIGATION MEASURES

The following mitigation measures are recommended to ensure that potential geotechnical impacts will be less than significant:

V.D-1 In accordance with the City of Long Beach Municipal Code and the Lakewood Municipal Code, the Applicant shall prepare a geotechnical study specific to each building to be constructed as part of the project as well as to the specific site within the project site proposed to be developed. The geotechnical study shall evaluate seismic hazards, including the potential for liquefaction, to a level of detail sufficient to satisfy the California Department of Conservation, California Geological Survey, the California Building Code, and the UBC.

Monitoring Phase: Pre-construction

Enforcement Agency: City of Long Beach Department of Planning and Building and City of Lakewood Community Development Department

Monitoring Agency: City of Long Beach Department of Planning and Building and City of Lakewood Community Development Department

Action Indicating Compliance: Approval of Geotechnical Studies

V.D-2 Grading plans shall be designed such that the final grades on-site are compatible with the grades of the adjacent streetscape to prevent soil erosion from flowing off-site.

Monitoring Phase: Pre-construction

Enforcement Agency: City of Long Beach Department of Planning and Building and City of Lakewood Community Development Department

Monitoring Agency: City of Long Beach Department of Planning and Building and City of Lakewood Community Development Department

Action Indicating Compliance: Grading Plan Approval

5. SIGNIFICANCE AFTER MITIGATION

With implementation of the recommended mitigation measures, significant geotechnical impacts associated with grading, site design, and seismicity will not occur as a result of the proposed project.